MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

BMM 1014 – MATHEMATICS FOR MANAGERS

(All Sections / Groups)

25 OCTOBER 2017
9.00 a.m. to 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 5 pages with 4 questions only.
2. Attempt all **FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.
4. Formulae are attached at the end of the question paper.

QUESTION 1

(a) Suppose a firm manufactures radios and sells them for RM880 each. If the costs incurred in the production and sale of the radios are RM300,030 plus RM210 for each radio produced and sold.

(i) Write the profit function for the production and sale of x radios. Find the break-even point. (4 marks)

(ii) Find the profit or loss of the firm if the firm manages to sell 2330 radios? (2 marks)

Now suppose that the increased in material cost has raised the variable cost to RM550 per radio and the fixed cost has increased to RM800,300.

(iii) Find the new break-even level of the firm. (3 marks)

(iv) If the company expects to sell 12,000 radios, what fixed cost should be charged in order to break-even? (3 marks)

(b) A small manufacturing plant makes three types of inflatable boats: models A, B, and C. Each model A boat requires 600 minutes of cutting, 60 minutes of assembly, and 60 minutes of finishing. Each model B boat requires 120 minutes of cutting, 540 minutes of assembly, and 60 minutes of finishing. Each model C boat requires 120 minutes of cutting, 300 minutes of finishing and 180 minutes of assembly. Each month, there are 2820 hours available in the cutting department, 1610 hours in the finishing department, and 2390 hours in the assembly department. How many boats of each model should be manufactured each month if all available time is used? (13 marks)

(Total: 25 marks)

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QUESTION 2

An appliances manufacturer produces two types of slow cooker: Type 1 and Type 2. Both models require fabrication and assembly work; each Type 1 slow cooker requires 4 hours of fabrication and 2 hours of assembly, and each Type 2 slow cooker requires 2 hours of fabrication and 6 hours of assembly. There are 700 hours of fabrication and 800 hours of assembly time available this month. Each Type 1 slow cooker contributes RM50 to profit, and each Type 2 contributes RM60 to profit. The manufacturer received orders of at least 80 units of Type 1 slow cooker and a minimum of 70 units of Type 2 slow cooker. Because of the company policy, the number of units of Type 2 slow cooker produced must be less than the number of units of Type 1 slow cooker.

(a) Formulate a liner programing model of this problem. (7 marks)

(b) Graph and show the feasible region of the above problem clearly. (5 marks)

(c) How many units of each type of slow cooker should be produced in order to maximize the profit? What is the maximum profit? (13 marks)

(Total: 25 marks)

QUESTION 3

(a) Find the accumulated amount after six years if $3700 is invested at 5% per year compounded continuously. (5 marks)

(b) You have a choice of two banks. Bank A pays interest at 4.66% compounded 360 times a year and bank B pays interest at 4.65% compounded 365 times a year. Which is the better choice? (7 marks)

(c) Simon and Mary have a business from which they take a profit of $1000 at the end of each month. If they deposit this into an account paying 7.8% per year compounded monthly, how much will they have in 5 years? (5 marks)

(d) Your neighbor bought a new car. Being a nosy neighbor, you want to know what price he paid for the car, but all you can find out is that he made a down payment of $32,000 and that his monthly payment on a seven year loan with an interest rate of 3.5% per year compounded monthly is $1560. What was the purchase price of the car? (8 marks)

(Total: 25 marks)

Continued...

QUESTION 4

(a) Given the cost of building a bungalow can be expressed as function stated below:

$$C(x) = 4000 + 25x^{\frac{3}{2}} + 8x$$

where x is represented as thousand units of bungalow. Determine the number of bungalows that need to be build in order to achieve minimum average cost.

(7 marks)

(b) The profit from the sale of x units of chairs and y units of tables is given by

$$P(x,y) = -4x^2 - 2y^2 + 400x + 88y + 7000$$

Find the value of x and y that lead to the maximum profit. What is the maximum profit?

(10 marks)

(c) A company incurs debt at a rate of

$$D'(t) = 108(2t^3 + 1)(3t^4 + 6t)^{\frac{4}{3}}$$

ringgit per year, where t is the amount of time (in years) since the company began. By the second year, the company has accumulated RM 50 000 in debt. Find the total debt function. (8 marks)

(Total: 25 marks)

End of Paper

LIST OF FORMULA

1. Quadratic Formula

The solution of the equation:
$ax^2 + bx + c = 0$,
$a \neq 0$, are $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2. Simple Interest

Interest, $I = Prt$ (P = principal, r = interest rate, t = number of years)
Accumulated amount, $A = P(1 + rt)$

3. Compound Interest

Accumulated amount, $A = P(1 + i)^n$, where $i = r/m$, and $n = mt$ (m = number of conversion periods per year)

4. Continuous Compound Interest

$A = Pe^{rt}$

5. Effective Rate of Interest

$r_{eff} = (1 + r/m)^m - 1$

6. Present Value for Compound Interest

$P = A(1 + i)^{-n}$

7. Future Value of an Annuity

$$S = R\left[\frac{(1+i)^n - 1}{i}\right]$$

(S = future value of ordinary annuity of n payments of R dollars periodic payment)

8. Present Value of an Annuity

$$P = R\left[\frac{1-(1+i)^{-n}}{i}\right]$$

(P = present value of ordinary annuity of n payments of R dollars periodic payment)

9. Amortization Formula

$$R = \left[\frac{Pi}{1-(1+i)^{-n}} \right]$$

(R = periodic payment on a loan of P dollars to be amortized over n periods)

10. Sinking Fund Formula

$$R = \left[\frac{Si}{(1+i)^{n}-1} \right]$$

(R = periodic payment required to accumulate S dollars over n periods)

Calculus

11. Product rule

$$f(x) = u(x).v(x)$$

$$f'(x) = u(x).\frac{dv}{dx} + v(x).\frac{du}{dx}$$

12. Quotient rule

$$f(x) = \frac{u(x)}{v(x)}$$

$$f'(x) = \frac{v(x)\frac{du}{dx} - u(x)\frac{dv}{dx}}{[v(x)]^2}$$